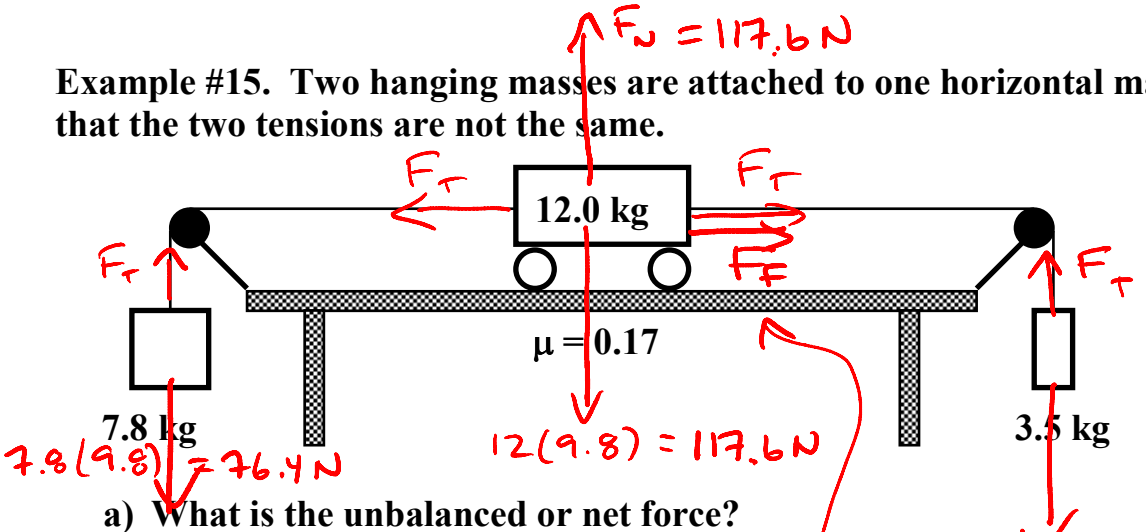
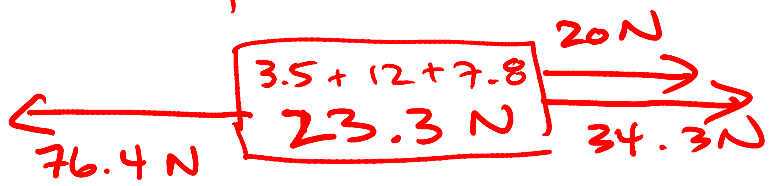
Example #15. Two hanging masses are attached to one horizontal mass. Note that the two tensions are not the same.



a) What is the unbalanced or net force?
b) What is the acceleration of the system?
c) What is the tension in each rope?

$F_F = \mu F_N$
$= .17(117.6)$
$= 20\ N$ (to the right, opposing motion)

a) f.b.d of system:



$F_{net} = 76.4 - (34.3 + 20)$ $\boxed{F_{net} = 22\ N}$ (22.1)

b) $F_{net} = m_+ a$ $\quad 22.1 = 23.3a$ $\boxed{a = 0.95\ m/s^2}$

c)

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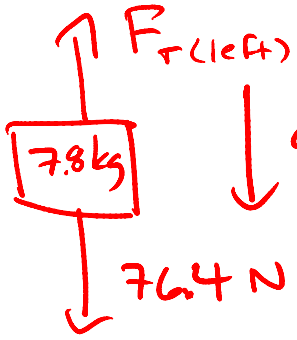
→ F.b.d of 7.8 kg mass:



$a = .95\ m/s^2 \Rightarrow F_{Net} = 7.8(.95)$

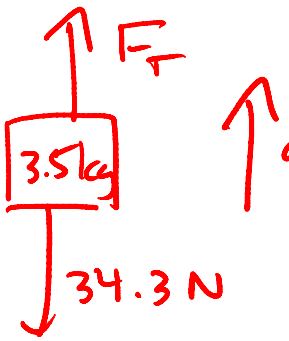
$= 7.4\ N$

$\rightarrow 76.4 > F_T$, so

$F_{Net} = 76.4 - F_{T(left)}$

$F_T = 76.4 - 7.4$ $\boxed{F_T = 69\ N}$

→ f.b.d. of 3.5 kg mass:



$a = .95\ m/s^2 \Rightarrow F_{Net} = 3.5(.95)$

$= 3.3\ N$

$\rightarrow F_T > 34.3$, so

$F_{Net} = F_T - 34.3$

$F_T = 34.3 + 3.3$ $\boxed{F_T = 38\ N}$